The workspace design concept: A new framework of participatory ergonomics

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The Workspace Design concept: A new framework of participatory ergonomics

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The concept of Workspace Design is presented as a potential new approach for ergonomists and consultants in the occupational health service. The concept is aimed as an intervention and facilitation strategy in the early stages of design processes leading to new workplaces. Preliminary results from a case study demonstrate how Workspace Design can contribute to a technical change process.

Workspace design, participatory ergonomics, OHS consultants

1 Introduction

It is a well recognized understanding among ergonomists that ergonomics considerations should be integrated in the early stages of design processes leading to new workplaces. Such design processes may encompass the development and implementation of new production technologies as well as new concepts for work organization. In the literature different approaches to integrate ergonomics into design processes can be identified ranging from heighten the ergonomics knowledge and skills of individual design engineers to organizational measures ensuring the participation of ergonomists in specific stages of the design process (Broberg 2007).

In a previous study it has been shown that the ability to behave as a 'political reflective navigator' might be a success factor for occupational health service (OHS) consultants operating in the early stages of design processes (Broberg & Hermund 2004). However, in stead of 'pushing' ergonomics into the design process the ergonomists could take another role. We suggest the role as 'workspace designer'. In this role the ergonomist takes a more design oriented approach with emphasis on organizing the design process. This approach is also stressed in the broad field of participatory ergonomics (Vink, Koningsveld, & Molenbroek 2006).

2 Objectives

The objective of this paper is (i) to describe the concept of 'workspace design' as a potential new approach for ergonomists and other OHS consultants, and (ii) to describe preliminary results of this approach from a case involving the design and implementation of new mixing technology in an industrial plant. The basic research question is: How does the workspace design concept contribute to a technical change process?

3 Workspace Design

The notion of workspace design is inspired by research at MIT School of Architecture and Planning in the 90's where Horgen and colleagues developed an approach of 'process architecture' (Horgen et al. 1999). That approach and its framework was clearly related to architectural issues on the work space and layout of buildings in order to sup-

port the work processes taking place in the rooms. At the same time, the framework had a general character allowing for a broader field of application. We see our notion of workspace design then as a concept of staging the processes in which new or changed workplaces are being created and shaped. Workspace is taken in a broad sense and relates to the SOFT model by Horgen et al. (Fig. 1).

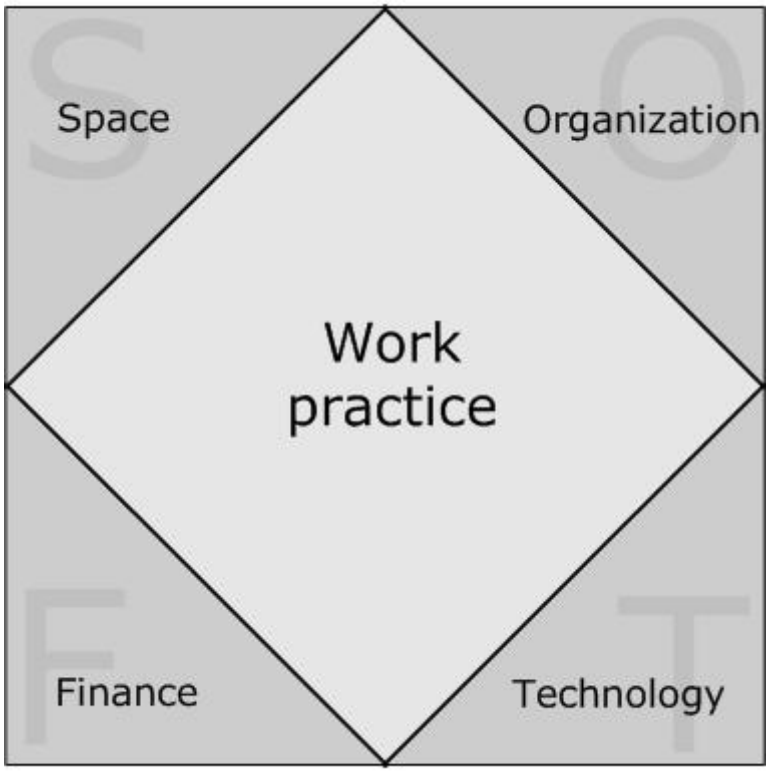

Figure 1. The SOFT model (Horgen et al. 1999)

The workplace with work practices is embedded in the workspace with four dimensions: spatial, organizational, financial, and technological. These dimensions are interdependent and in a dynamic relationship with one another. A change in one may demands change in others. Staging the workspace design process is aimed at creating a dynamic coherence between work and these four dimensions of the workspace. Creating and shaping of workplaces is influenced by the actors who populate each of the four corners. The workplace-making is in fact often a by-product of independent design activities and decision-making by actors in each corner (Launis, Vuori, & Lehtelä 1996). This might result in workplaces which are not in coherence with the four dimensions, and hence workplaces which do not support the goals of the work process in an optimal way and the ergonomics of the workplace might be poor. The basic idea in the concept of workspace design is that actors are needed, who are capable of working across the four corners, facilitating and negotiating the process of workplace-making with the different actors. These actors are staging the workspace design process, they are workspace designers. This is a job of creating shared visions among actors with different perspectives and competencies, overcoming resistance and political interests, setting up a collaborative design process, and facilitates meetings between actors from different corners in the SOFT model.

Additionally, it is a core feature of the workspace design concept that staging the process is based on user participation. This implicates that methodologies and tools for user participation are an important element in the concept. And finally, the concept is aimed at helping organizations creating effective as well as sound workplaces meaning healthy and safe work conditions and good ergonomics.

3.1 Who can take on the role as workspace designer?

In many organizations major change processes in work organization or technology are headed by a project manager. Hence, internal project managers could take the role as workspace designers. We envision, however, that the role as workspace designer is obvious for many ergonomists working with macro-ergonomics and consultants in the occupational health services. In Denmark the OHS is under re-construction due to a reform of the work environment legislation. In the future, OHS units have to work on a liberalized market as ordinary consultancy firms. Because of that, many OHS units are looking for new market opportunities in order to sell their services. On this back ground we established a research programme aiming at developing and testing the concept of workspace design as a potential new service from the OHS units, and possibly other consultants as well as internal project managers in organizations. OHS consultants are part of the programme and the concept are being tested out in three intervention case studies in which organizations undergoing technological and organizational changes are being studied.

4 Methods

The test of the Workspace Design (WSD) concept took place in three case companies. In this paper we report a preliminary analysis of the industrial manufacturing case in which a company were to implement a new mixing technology in their production line. The WSD project team included researchers, consultants and a consultant from the OHS unit normally serving the case company. This team was split up in interventionists and follow-up researchers. The first group was responsible for planning and completion of activities aimed at setting up a participatory design process in the company in order to optimize ergonomics and efficiency in a production facility under construction. The other group was responsible for establishing a baseline of data on: Basic features of the company, existing production system including ergonomics, the course of the design process so far, and the level of occupational safety and health management. This group also observed the interventions and made follow-up interviews with participants in order to clarify the effects of the intervention.

The OHS consultant was part of the first group. In that way a potential new role of the OHS consultant was developed in a mutual learning process. The idea was that the activities planned and completed in that group could be the job of the OHS consultant in future consultancy tasks for companies.

5 Case study: The contributions by the Workspace Design approach

In this particular case the intervention by the WSD team have contributed to the process of implementing the new mixing technology in several ways.

When the company agreed to take part in the WSD project the management presented the change process as a question of setting up new machinery in an empty facility which needed no redesign. The external design engineers had designed a proposal for a technical system including the new functionality provided by the continuous process technology and the piping connected to the machinery. The first effect of the WSD intervention was the re-opening of the facility lay out design. This focus was based on the teams' recognition that the machine design was in the very final phase and hence not subject to major changes. The WSD team proposed the project manager to focus on the layout in two workshops. The team requested the project manager to ask the two external design engineers to take part in the workshops. Without this alliance with the project manager their attendance seemed doubtful. The project manager also approved that the design proposals could be subjected to a re-evaluation in the workshops.

The re-opening of the lay out design was "executed" in the workshops and the new proposal emerged from the operators and was taken further in a collaborative design process. By the layout design games the WSD team facilitated the meeting between production managers, design engineers and all the operators from the mixing facility. The game board and the pieces were operating as appropriate 'boundary objects' (Wenger 2000) allowing connections between different work practices. Hence, the game board and the pieces enabled multiple practices to initiate a collaborative design process over an artefact which could be comprehended and interpreted by all participants.

The layout design games and later on the use scenarios became a reframing of the design artefacts. Bringing in the work practices of the operators and their knowledge and experiences enlarged the design artefacts to include redesign of the new production facility, work procedures, equipment, cleaning, maintenance and a number of work environment features.

5.1 "Transmitter substances" from the workshops

Besides the role as facilitator it turned out that the WSD team had an important role in formalizing and preserving the outcomes of the workshops. In the case of the use scenarios the problems, possible solutions or things to be further investigated were written on flip charts during the workshops. Afterwards they were systematized and elaborated in listings in a formal document provided to the participants. These listings were valued very much by the production management – they seemed to be in the right format for the project manager. The listings were the outcome of the workshops, the format in which design proposals, things to be done or remembered were preserved.

The workshops themselves contributed to set up a temporary learning context in which the daily power relations, expert roles and decision-making processes receded. In that way they enabled activities focussing on a collaborative design process and a mutual learning process. It was important, however, that the outcomes of the workshops were transmitted to daily life in the organization in order to enter into decision-making processes. As mentioned previously the listings were an important 'transmitter substance' and the project manager himself an important 'transmitter actor'. By revising the requirement specification document part of the outcomes were preserved in ordinary documents.

6 Conclusion

We believe this case demonstrates the potential of Workspace Design to become a new OHS consulting concept. We do not claim it to be a management concept but still it might be useful to compare to those. A management concept offers "a theory of organizations' success" and "measures and tools" (Kamp et al. 2005). The first one comprises a diagnosis of current and future problems linked to suggested solutions. The second one includes analytical frameworks, measures and tools aimed at the strategic, technological and organizational level.

Workspace Design offers a diagnosis to companies that are of strategic importance to ensure a dynamic coherence between the four corners in the SOFT model. In order to pursue this it is necessary to stage the workplace-making process by facilitating meetings between actors from the different corners. Measures and tools to do that is offered by the WSD concept based on participatory methods.

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